The genus *Chaetopleura* Shuttleworth, 1853

(Mollusca : Polyplacophora)

in the Warm-Temperate and Tropical Eastern Pacific, Southern California to Peru, with the Description of Two New Species

BY

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(4 Plates; 15 Text figures)

INTRODUCTION

In the course of investigating the chiton fauna of the eastern Pacific, it became apparent that a species of *Chaetopleura* described and illustrated a decade ago (Thorpe *in* Keen, 1971) had remained unnamed. In the process of providing the new species with a valid name, it was necessary to reconsider the prevailing understanding of other species in the genus, a process which eventually led to the discovery of a number of serious errors that had become ingrained in the literature of the group.

In carrying out of this review, I was favored by the availability of large collections of chitons from the tropical and warm-temperate eastern Pacific, particularly those in the repository of the California Academy of Sciences, San Francisco, (CAS), Stanford University (SU) [at CAS], Natural History Museum of Los Angeles County (LACM), Allan Hancock Foundation (AHF) [at LACM], San Diego Museum of Natural History (SDMNH), Academy of Natural Sciences of Philadelphia (ANSP), U.S. National Museum of Natural History (USNM), British Museum (Natural History) (BMNH), Muséum National d'Histoire Naturelle, Paris, (MNHN), and in the private collections of Laura B. Shy, Col. George A. Hanselman, and Antonio J. Ferreira (AJF-station numbers on file at CAS).

The following abbreviations for type designations are used: M = monotypy; OD = original designation; SD = subsequent designation.

The distinctions among the different species of *Chaetopleura* in the tropical and warm-temperate eastern Pacific were difficult to ferret out. In view of the unexpected conclusions of this investigation, a word is in order concerning methodology.

Initial endeavors to segregate specimens of *Chaetopleura* in accordance with named descriptions were, for the most part, fruitless. The original descriptions and stated differences among species of *Chaetopleura* with exclusive emphasis on tegmental sculpture and macroscopic girdle elements soon proved inadequate to unequivocal species assignment and taxonomic decisions. Several species of *Chaetopleura*, it was found, differ in characters which, being subtle, had been overlooked by earlier workers. Thus, a *tabula rasa* approach was adopted. The basic question raised: How many biological species of *Chaetopleura* can there be recognized in eastern Pacific collections?

Accordingly, every available specimen of *Chaetopleura* [the identification of the genus posed no serious problem] from the eastern Pacific was classified, at first, simply as "species A," "species B," "species C," etc. with no regard for museum (or collector's) label, geographic locality, or depth. The classification criterion was purely morphologic, based not only on the shell but on microscopic data derived from the examination of the mounted girdle and radula. With this approach, entailing the disarticulating of many specimens, consistent patterns eventually emerged which permitted the firm recognition of 5 species of *Chaetopleura* in the tropical and warm-temperate eastern Pacific. The nomenclatural problems involved in the subsequent naming of these species are treated in the systematic section of this paper.

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In the course of this investigation it became apparent that some anatomical features of chitons, particularly the radula, the mucro and what is here called the girdle bridges, had not been given adequate consideration by former workers.

The mucro has been considered in the descriptive anatomy of chitons at least since Middendorff (1847: 9). But its definition lacked precision. Smith (1960: 46) defined it as the "point or projection in the tail valve, usually marking a separation between the configuration of the central and posterior areas." The problem, of course, is with the word "usually" for there are instances when the salient point on the valve does not coincide with the separation between the central and posterior areas, resulting in unclear descriptions. In view of the common usage of the terms mucro and postmucro (applied to the posterior area of the tail valve), it is here proposed that **mucro** be used for the median point on the tail valve where the central and posterior configurations (*i.e.*, sculptural patterns) meet, a point which is "usually" the salient point of the valve; and that the term **false mucro** be used for those situations, such as in the case of most specimens of *Chaetopleura lanuginosa*, where the prominence or salience of the tail valve is located in the postmucro (often strongly convex) area.

The **girdle bridges** refer to the tenuous prolongations of the girdle that extend between valves at the sutural joints and so bridge both sides of the girdle. In most species studied, when examined under the microscope, these girdle bridges are "empty," that is to say, they appear as amorphous, transparent cuticles devoid of scales, hairs, or spicular elements; but, by contrast, in a few species, such as *Calloplax janeirensis* (Gray, 1828) [see Ferreira, 1978: 58] and some members of *Chaetopleura*, the bridges are packed with spicular elements throughout.

HISTORICAL SYNOPSIS

1853. Shuttleworth erected *Chaetopleura* to accommodate three species, *"Chiton rugosus* (Gray) Sowb., Ind. Oc. / *Chiton peruvianus* Lam., Chili / *Chiton gigas* Chemn., Cap. Bon Spei." The new genus was distinguished from *Acanthopleura* Gray, on the basis of the girdle elements, and defined *"Valvae transversae, externae; lamina insertionis valvarum terminalium plurilobata, posticae interdum subobsoleta, mediarum bilbata; limbus setis corneis obsitus"* (pp. 66-67).

1854. Adams & Adams defined *Chaetopleura* (with *Eudoxochiton* Shuttleworth, 1853, and *Craspedochiton* Shuttleworth, 1853, as synonyms): "Mantle beset with horny bristles. Shell with the valves external, broad, transverse; the hinder valve with the apex sub-central" (p. 475). They included 8 species in the genus, *"fulva,* Wood / *Hanleyi,* Bean / *Hennahi,* Gray / *laqueata,* Reeve / *nobilis,* Gray / *Peruviana,* Lam. / *rugosa,* Sow. / *Watsonii,* Sow." (p. 476).

1856. Shuttleworth described two new species of *Chaetopleura* from the Antilles, *Chiton (Chaetopleura) asper,* and *Chiton (Chaetopleura) candisatus,* observing that the latter has affinity to *"C. (Chaëtopleura) Hanleyi* Bean [1844]...(and) *C. (Chaetopleura) apiculato* Say" (p. 169).

1857. Gray made no mention of *Chaetopleura,* placing *Chiton peruvianus* Lamarck in *Acanthopleura.*

1864. Adams & Angas described *Chaetopleura conspersa* from Port Lincoln, Australia.

1879. Dall, following Carpenter's unpublished manuscript, recognized *Chaetopleura* in the "Ischnoidea" group of "Regular Chitons," and explicitly designated *C. peruviana* as its type species. He diagnosed the genus, *"Testa Ischnochitoni similis; zona plus minusve pilosa. Branchiae ambientes"* (p. 329), adding a new species, *Chaetopleura gemma,* and bringing two others, *Chiton hartwegii* Carpenter, 1855 and *C. nuttallii* Carpenter, 1855, into it.

1892. Pilsbry recognized *Chaetopleura,* relating it to *Tonicia,* with the diagnosis, "Valves as in *Ischnochiton; eaves solid* [italics, Pilsbry's]; girdle leathery, more or less hairy; gills extending almost or entirely to the front end of the foot" (14: 27). Pilsbry (14: 28) considered the genus divisible into "several" groups of species, although he mentioned only two: 1) group of *C. peruviana,* "typical forms, rather large, and having very delicate sculpture," and 2) group of *C. gemma,* "having the lateral areas strongly raised and coarsely sculptured, the central areas also sculptured."

1899. Plate erected Chaetopleurinae as a subfamily of Ischnochitonidae to accommodate the genera *Chaetopleura* and *Variolepsis* Plate, 1899.

1901. Plate suppressed Chaetopleurinae, and placed *Chaetopleura* in Ischnochitoninae.

1929. Thiele defined *Chaetopleura:* "Surface of the shell with pustules, in the end valves and lateral areas in radial riblets or disorganized, in the central areas in longitudinal riblets. Upper side of girdle with small calcareous scale-like or cylindrical processes, larger spicules, or more or less elongated hairs" (p. 16, transl.). Based on the radula, Thiele distinguished two subgenera: 1) *Pallochiton* Dall, 1879, including *C. (P.) lanuginosa* (Dall, 1879), with a tricuspid major lateral tooth, and 2) *Chaetopleura s. s.,* including *C. (C.) peruviana* (Lamarck, 1819) with bicuspid major lateral teeth.

1955. Bergenhayn placed *Chaetopleura, Dinoplax* Dall, 1882 and *Calloplax* Thiele, 1909, in the same family, Chaetopleuridae Plate, 1899.

1960. Smith accepted Bergenhayn's (1955) classification, and diagnosed *Chaetopleura:* "Small to medium sized, with valves somewhat as in *Ischnochiton,* ventral side porcelaneous, having rather sharp [insertion] teeth and squared sinus; eaves solid. Tegmentum usually sculptured with longitudinal beaded riblets on central areas, and pustules or pustulose ribs on lateral areas of intermediate and end valves, pustules being irregularly arranged in some groups" (p. 60).

1972. Kaas defined *Chaetopleura:* "Shell plates pustulate; on the end valves and lateral areas of the median valves the pustules are arranged in radial rows or scattered without order, on the central areas they are arranged in longitudinal rows. Upper side of girdle clothed with small scale-like or cylindrical calcareous corpuscules, between them spicules of different sizes" (p. 63).

1977. Van Belle defined the genus *Chaetopleura:* "Taille petite à moyenne, forme ovale, tegmentum pourvu de nodules radiaires ou placés sans ordre special, sinus subquadrangulaire et pourvu d'une plaque jugal, dents courtes et rugueuses" (p. 28).

SYSTEMATIC TREATMENT

POLYPLACOPHORA Gray, 1821

Neoloricata Bergenhayn, 1955

Ischnochitonina Bergenhayn, 1930

Chaetopleuridae Plate, 1899

Chaetopleura Shuttleworth, 1853

Definition: Small to large sized chitons. Tegmentum pustulose, with larger pustules arranged in quincunx or radial rows in the end-valves and lateral areas of intermediate valves, and smaller pustules in longitudinal rows or coalesced in riblets in the central areas. Insertion plates with rather sharp teeth; intermediate valves uni-slit. Eaves solid. Girdle covered with minute, simple, oval to spiculoid scales, with glassy, hyaline spicules and, in some species, horny hairs interspersed. Holobranchial, abanal gills. Radula median tooth wide, subquadrangular; major lateral teeth tricuspid or bicuspid.

Type species: *Chiton peruvianus* Lamarck, 1819, by SD (Dall, 1879).

Synonyms:

Choetopleura Shuttleworth, 1856 [nomen nullum]

Acanthopleura Gray, 1857 (not Guilding, 1829)
Type species: *Chiton peruvianus* Lamarck, 1819, by SD, based on the first species listed by Gray (1857: 183) under this genus name (Ferreira, herein)

Pallochiton Dall, 1879
Type species: *Pallochiton lanuginosus* Dall, 1879 by SD (Pilsbry, 1893)

Hemphillia Dall, 1879 (not Bland & Binney, 1872, a land slug)
Type species: *Pallochiton lanuginosus* Dall, 1879, by M

Arthuria Dall, 1882
Type species: *Arthuria filosa* Carpenter *in* Pilsbry, 1893c by SD (Pilsbry, 1893c)

Helioradsia Thiele, 1893
Type species: *Chaetopleura gemma* Dall, 1879, by M

Helicoradsia Simroth, 1894 [*nomen nullum*]

Variolepsis Plate, 1899
Type species: *Variolepsis iquiquensis* Plate, 1899, by OD

Typhlochiton Dall, 1921
Type species: *Typhlochiton felipponei* Dall, 1921b, by OD

Chetopleura Ashby, 1929 [nomen nullum]

Remarks: In terms of species diversity, the genus *Chaetopleura* has a rather uneven world distribution: It is well represented in the faunas of the eastern Pacific, both sides of the Atlantic, and South Africa, but apparently absent in the Indo-Pacific and the otherwise chiton-rich waters of Australia, New Zealand, and Japan.

In the eastern Pacific, *Chaetopleura* ranges from Canada to Chile. In the area covered by this review, the tropical warm-temperate zones of the eastern Pacific, from Point Conception, California [34°27′N] to Punta Aguja, Peru [5°48′S], 5 species are here recognized:

Chaetopleura scabricula (Sowerby, 1832)
Chaetopleura lanuginosa Dall, 1879
Chaetopleura unilineata Leloup, 1954
Chaetopleura roddae Ferreira, spec. nov.
Chaetopleura shyana Ferreira, spec nov.

Key morphological characters in the differential diagnosis of these species are brought together in Table 1.

Chaetopleura scabricula (Sowerby, 1832)

Figures *1, 2, 3, 4,* 5, 6, 7, 8, *9,* and *11*

Chiton scabriculus Sowerby (1st) *in* Broderip & Sowerby, 1832: 28—Sowerby (1st and 2nd), 1840: 8, no. 100; fig. 21—Reeve, 1847; plt. 15, sp. & fig. 81—Pilsbry, 1892, 14: 33 (as syn. of *Chaetopleura lurida* (Sowerby, 1832))—Keen, 1958: 524 (as syn. of *C. lurida*)—Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*)

"Chaetopleura lurida (Sowerby)" *ex auttore* treating Panamic species. Pilsbry, 1892, 14: 33-35; plt. 12, figs. 53-54—Steinbeck & Ricketts, 1941: 552; plt. 27, fig. 3 [Reprinted, 1971]—Keen, 1958: 524; Amphineura, sp. & fig. 35—Thorpe *in* Keen, 1971: 877-878, Polyplacophora, sp. & fig. 41—Abbott, 1974: 401—Smith, 1977: 217, 243, 246. [Not *Chiton luridus* Sowerby (1st) *in* Broderip & Sowerby, 1832: 26]

"Chiton columbiensis Sowerby, 1832" Sowerby (2nd), 1840: 8, no. 99, fig. 15 (as syn. of *C. spinulosus* Gray and *C. luridus* Sowerby)—Pilsbry, 1892, 14: 34-35; plt. 12, figs. 51-52 (as var. of *C. lurida*)—Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*). [Not *Chiton columbiensis* Sowerby, 1832]

Table 1

Key characters in the differential diagnosis of *Chaetopleura* species of the tropical eastern Pacific.
(* character present)

Species \ Characters	Body						
	Width/ length <0.60	Height/ length <0.20	Mucro posterior	Postmucro convex	Girdle with hairs	Girdle bridges with spicules	Radula bicuspid
Chaetopleura scabricula		*			*		
Chaetopleura lanuginosa			*	*		*	
Chaetopleura roddae						*	
Chaetopleura unilineata							*
Chaetopleura shyana	*	*		*		*	

"Chiton catenulatus Sowerby, 1832." Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*) [Not *Chiton catenulatus* Sowerby, 1832]

"Chiton jaspideus Gould 1846" Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*)—Abbott, 1974: 401 (as syn. of *C. lurida*). [Not *Chiton jaspideus* Gould, 1846 (= *Chaeotopleura hennahi* (Gray, 1828) *fide* Smith, 1977)]

Lepidopleurus bullatus Carpenter, 1857a: 252, *nomen nudum;* 1857b: 195-196—Brann, 1966: 45; fig. 254—Keen, 1968: 434; plt. 59, fig. 95—Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*)—Smith, 1977: 217, 243 (as syn. of *C. lurida*)

Chaetopleura bullata (Carpenter). Pilsbry, 1892, 14: 31-32.

Chaetopleura (Chaetopleura) bullata (Carpenter). Keen, 1958: 524; Amphineura, sp. & fig. 33, 33a

Lepidopleurus bullatus calcifera Carpenter, 1857a: 252, *nomen nudum;* 1857b: 196—Brann, 1966: 45; fig. 245b—Keen, 1968: 434; plt. 59, fig. 96—Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*)—Smith, 1977: 217, 243

Chaetopleura bullata calcifera (Carpenter). Pilsbry, 1892, 14: 32—Keen, 1958: 524, Amphineura, sp. & fig. 33, 33a

Ischnochiton parallelus Carpenter, 1864a: 314 (Reprinted, 1872: 213); 1864b: 618 (Reprinted, 1872: 104)—Keen, 1958: 524 (as syn. of *C. lurida*)—Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*)—Smith, 1977: 217, 246 (as syn. of *C. lurida*)

Chaetopleura lurida var. *parallela* (Carpenter). Pilsbry, 1892, 14: 34; plt. 12, fig. 50

Chaetopleura parallela (Carpenter). Dall, 1921: 193—Oldroyd, 1927: 889-890—Smith, 1947a: 18; 1947b: 4—Palmer, 1945: 100; 1958: 267—Abbott, 1974: 401 *("lurida?")*

Ischnochiton prasinatus Carpenter, 1864a: 315 (Reprinted, 1872: 213); 1864b: 618 (Reprinted, 1872: 104)—Keen, 1958: 524 (as syn. of *C. lurida*)—Thorpe *in* Keen, 1971: 877 (as syn. of *C. lurida*)—Smith, 1977: 217, 246 (as syn. of *C. lurida*)

Chaetopleura lurida var. *prasinata* (Carpenter). Pilsbry, 1892, 14: 34

Chaetopleura prasinata (Carpenter). Dall, 1921: 193—Oldroyd, 1927: 889—Burch, 1942: 7—Smith, 1947a: 18; 1947b: 4-5—Palmer, 1958: 267—Abbott, 1974: 407 *("lurida?")*

Choetopleura [sic] *dacrydigera* Rochebrune, 1882: 193

Nomenclatural Comments: Sowerby (1st of name) *in* Broderip & Sowerby, 1832, described three tropical eastern Pacific species of chitons referable to *Chaetopleura, Chiton luridus* (p. 26), *C. scabriculus* (p. 28), and *C. columbiensis* (p. 58). But the descriptions, except for the girdles differentially characterized as *"velutino"* in *C. luridus, "piloso"* in *C. scabriculus,* and *"granoso"* in *C. columbiensis,* left the species virtually indistinguishable among themselves. Further information about these species was imparted by Sowerby *(op. cit.)* on associating, on the basis of the girdle, *C. luridus* with *C. limaciformis,* and *C. columbiensis* with *C. dispar, C. rugulatus* and *C. punctulatissimus,* and on describing *C. catenulatus,* despite its *"laevi"* girdle, as a species which "in general appearance...resembles *Chit. luridus"* (1832: 104). When first figured by Sowerby (1833, *Conchological Illustrations, Chiton,* figs. 20, 21, and 15, respectively, *fide* Corrected List of Figures, 1840: 9) in the colored drawings of the day, the three species, *C. luridus, C. scabriculus,* and

Explanation of Figures *1* to *4, 9* to *11, 19*

Figure *1: Chaetopleura scabricula* (Sowerby, 1832). Specimen 22 mm long (AJF 307, Playa La Angosta, Acapulco, Mexico)

Figure *2: Chaetopleura scabricula* (Sowerby, 1832). Specimen 16 mm long (AJF 305, Zihuatanejo, Mexico). Lateral areas and girdle

Figure *3: Chaetopleura scabricula* (Sowerby, 1832). Specimen 16 mm long (AJF 307). Tegmental surface of valves i, ii, and viii

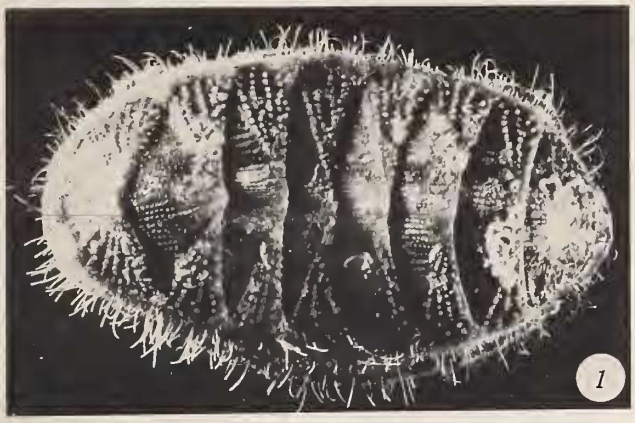
Figure *4: Chaetopleura scabricula* (Sowerby, 1832). Same specimen as in Fig. *3.* Articulamental surface of valve viii

Figure *9: Chaetopleura scabricula* (Sowerby, 1832): *Chiton scabriculus* Sowerby, 1832 **lectotype** (BMNH 1980113)

Figure *10: Chiton columbiensis* Sowerby, 1832. **Lectotype** (BMNH 198111)

Figure *11: Chaetopleura scabricula* (Sowerby, 1832): *Choetopleura dacrydigera* Rochebrune, 1882, holotype (MNHN)

Figure *19: Chaetopleura lanuginosa* (Dall, 1879): *Pallochiton (Arthuria) filosus* Carpenter in Pilsbry, 1893, **lectotype** (BMNH 1980115)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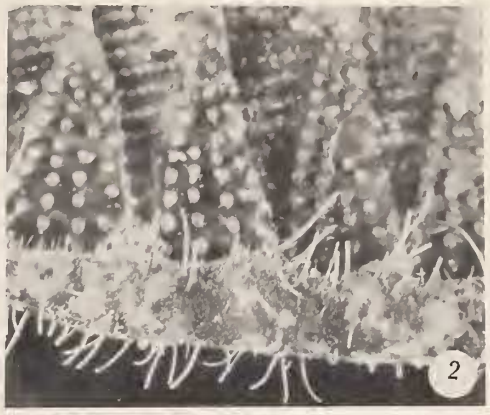
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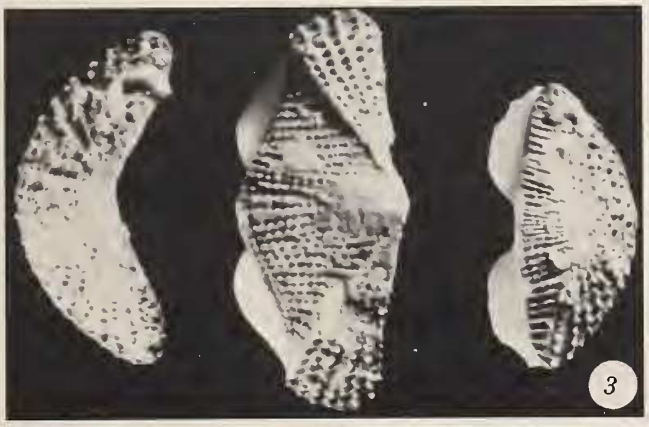
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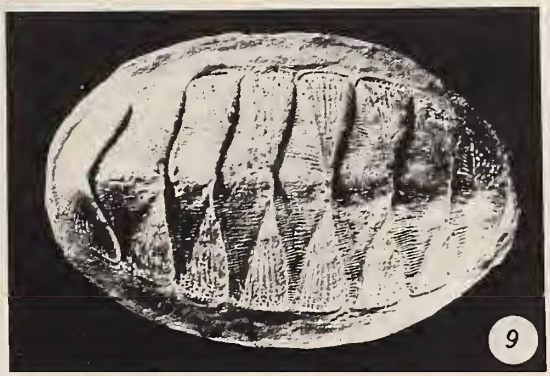
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10


11


19

C. columbiensis, retained their apparent similarity with no feature standing out to permit ready differential diagnosis. Reeve's (1847) illustrations of the species (plt. 15, figs. 85, 81, and 82, respectively) failed to elucidate the diagnostic problems involved and, instead, compounded the difficulties by figuring as *C. luridus* a specimen other than Sowerby's, and pointing out that the sculpture of *C. columbiensis* "is very similar to that of *C. luridus*."

Despite the ambiguities, Pilsbry (1892), following Carpenter's unpublished manuscript, concluded for the synonymity of these three species and adopted the name *"Chaetopleura lurida"* for the common "hairy" chiton of the eastern tropical Pacific, an action which has been accepted uncritically to this day.

Examination of Sowerby's type material, on loan from the British Museum (Natural History), brought to light the fact that the single specimen labeled *Chiton luridus* in the H. Cuming collection and regarded as "? holotype;... syntype," although a *Chaetopleura*, does not correspond to *"lurida"* of authors. From the shell alone, this "syntype" of *luridus* could qualify as either one of two other species of *Chaetopleura* in the area; but without the microscopic study of the radula (no longer available in the specimen), girdle elements, and girdle bridges, the biological species corresponding to Sowerby's *C. luridus* remains undeterminable. Thus, the nominal species *C. luridus* Sowerby, 1832, is here suppressed as a *nomen dubium*, and the biological species known heretofore as *"Chaetopleura lurida"* of authors given the next available name, *scabriculus* Sowerby, 1832.

It must be added that the type specimens of *C. scabriculus* agree unequivocally with both, Sowerby's (1832) description and illustration of the species and the current concept of *"lurida"* of authors. The name *columbiensis* is here suppressed, also, as a *nomen dubium*.

Type Material: *Chiton scabriculus* Sowerby, 1832: **Lectotype** (BMNH 1980113) and **paralectotypes** (BMNH 1980114) herein designated; locality, *"ad littora* Americae centralis (Guacomayo and Puerto Portrero)."

Lepidopleurus bullatus Carpenter, 1857: Holotype (BMNH, Tablet no. 902, Mazatlan Colln.); locality, "Mazatlan," Sinaloa, Mexico [23°13′N; 106°25′W].

Lepidopleurus bullatus calciferus Carpenter, 1857: Holotype (BMNH, Tablet no. 903, Mazatlan Colln.); locality, "Mazatlan," Sinaloa, Mexico [23°13′N; 106°25′W].

Ischnochiton parallelus Carpenter, 1864a: Lectotype (USNM 4017; Redpath Museum, Montreal, Canada, no. 46) designated by Smith (1977); locality, Cabo San Lucas, Baja California Sur, Mexico [22°50′N; 109°55′W].

Ischnochiton prasinatus Carpenter, 1864: Holotype (USNM 15892); locality, Cabo San Lucas, Baja California Sur, Mexico [22°50′N; 109°55′W].

Choetopleura dacrydigera Rochebrune, 1882: Holotype (Muséum National d'Histoire Naturelle, Paris); locality, "Amérique Central," here restricted to the eastern Pacific.

Type Locality: Here restricted to Puerto Portrero, Costa Rica (10°28′N; 85°47′W).

Original Description: *"Chit. testá ovali, planiuscula, cinereá, albido-variegatá; valvá anticá, areis lateralibus valvarum intermediarum et parte posticá valvae posticae radiatim scabroso-lineatis; valvis intermediis et parte anticá valvae posticae longitudinaliter sulcatis; limbo piloso, cinereo, rufoarticulato: long. 1 1/10, lat. 9/20 poll.,"* under the classifying heading of *"Ligamento marginis piloso."* (Sowerby *in* Broderip & Sowerby, 1832: 28).

Description: Medium sized, carinate chitons (Figures *1*, *2*, *3*, and *4*). Color variable, gray to brownish green predominating, occasionally with suffusions of red or patches of cream. Largest specimen examined, 38 mm long (LACM 65-13, Islas Tres Marias, Mexico). Body width/length, mean 0.61; height/length, mean 0.15. Tegmentum pustulose; on end valves and lateral areas of intermediate valves, round pustules, about 100 μm in height and diameter, usually well defined in radial rows (14-24 on anterior valve, 10-16 on posterior valve, 4-6 on lateral areas); on central areas of intermediate valves, pustules appreciably smaller (about 30-50 μm in height and diameter), often coalescing into granose riblets (15-25 per side); on valve ii jugal tract of riblets fans out forward outlining wedge-like figure. Mucro central or slightly anterior; postmucro area straight to slightly concave. Posterior edge of valves iii to vii, straight, *i.e.*, not beaked or angled. Articulamentum bluish-white. Insertion teeth well defined, followed by slit-rays; slit formula range 9/11-1-8/13, mode 10-1-9. Sutural laminae subtriangular on valve ii, subrectangular on posterior valves. Relative width of sinus (width of sinus / width of sutural lamina) on valve viii, mean 0.30. Width of valve i / width of valve viii, mean 1.12. Gills, about 30 plumes per side, holobranchial, abanal. Girdle's upper surface (Figure 5) covered with

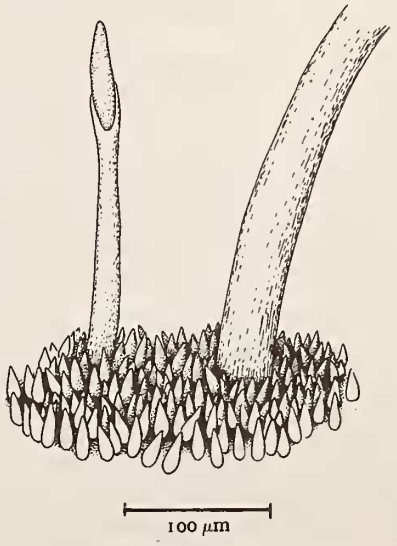


Figure 5

Chaetopleura scabricula (Sowerby, 1832). Specimen 16 mm long (AJF 307, Playa La Angosta, Acapulco, Mexico). Girdle's upper surface scales and hair

simple, chaffy scales [not unlike those of lepidochitonids], often triangular in outline, about 25 × 10 μm, and abundant, conspicuous, golden-brown, corneous, not dendritic hairs, up to 1mm long in an average specimen (up to 2mm in large ones) and about 50 μm thick, randomly (*i.e.*, not bunched up in tufts) distributed; bridges' (Figure 6)

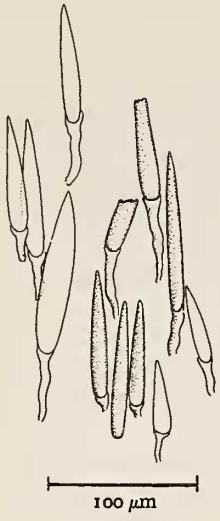


Figure 6

Chaetopleura scabricula (Sowerby, 1832). Same specimen as in Figure 5. Spicules from the outer ¼ of girdle's bridges

outer ⅓ or ¼ packed with transparent, slender (150 × 15 μm) spicules, close together in palisade, but empty of spicular elements in their middle ½ or ⅓; undersurface (Figure 7) paved with transparent, rectangular (35 × 25 μm) scales with convex, protuberant outer edge and concave inner edge.

Radula (Figure 8) comprises about 35 rows of mature teeth. In a disarticulated specimen (AJF 307, Playa La Angosta, Acapulco, Guerrero, Mexico), 16mm long, median tooth rectangular, 250 μm long, 160 μm wide at anterior blade; first lateral teeth cup-shaped with thickened anterior edge; major lateral teeth with long protuberance at inner side of distal end, and tricuspid head, 280 μm long (at middle cusp), 180 μm wide; outer marginal teeth elongate, about 220 × 140 μm.

Distribution: The geographic range of *Chaetopleura scabricula* extends from the central part of the Gulf of California, Mexico, to northern Colombia. Northernmost verified record in the Gulf of California, Bahía de San Francisquito, Baja California, Mexico [28°26′N; 112°53′W] (CASG 23779); southernmost verified record, Gorgona Id., Colombia [2°58′N; 78°11′W] (LACM-AHF 405-35). Many

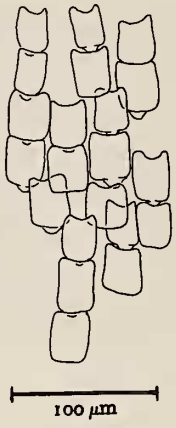


Figure 7

Chaetopleura scabricula (Sowerby, 1832). Same specimen as in Fig. 5. Girdle's undersurface scales

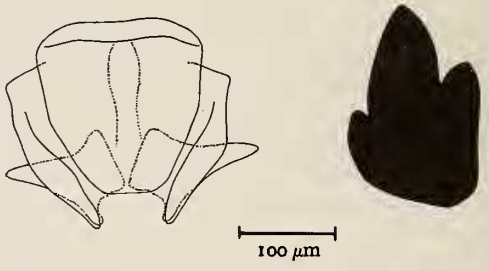


Figure 8

Chaetopleura scabricula (Sowerby, 1832). Same specimen as in Fig. 5. Radula's median tooth, first lateral teeth, and head of major lateral tooth

collecting records in between suggest a continuous distribution: Partida Id. (AJF 62), Espiritu Santo Id. (LACM-AHF 510-36); AJF 76; AJF 77; AJF 161; AJF 162), Ballena Id. (AJF 638), Cerralvo Id. (AJF 475), Bahía de los Muertos (AJF 599; AJF 639), Bahía Ventana (AJF 57; AJF 58), Los Frailes (AJF 471); Bahía Pulmo (AJF 474), Mazatlan (AJF, Mar. 1971), Manzanillo (Shy Coll.), Puerto Vallarta (AJF 430; AJF 431; AJF 432), Tres Marias Is. (LACM 65-13), Zihuatanejo (AJF 303; AJF 305), Acapulco (AJF 307), Puerto Escondido (AJF 300), Puerto Angel (AJF 302), Mexico; Zacatillo (AJF 13), Las Tunas (AJF 15), El Salvador; Tortugas Is. and Guanacaste Penins. (AJF on R/V *Searcher*, 1972), Costa Rica; El Velero (AJF 133), San Juan del Sur

(B. Keagan Coll.), Nicaragua; Perlas Is. (LACM 10800; LACM 10833; LACM 10848), Punta Mala (AJF 219), Veracruz (AJF 221), Contadora Id. (AJF 224), Bique (LACM 72-75), Perico Id. (LACM 70-17), Panama; Punta San Francisco (CAS 010088), Punta Cruces (CAS 010092), Port Utria (LACM-AHF 413-35), Colombia. *Chaetopleura scabricula* has been collected also at the oceanic islands of Revillagigedos, Mexico [19° N; 11° W], at San Benedicto (AJF 518), and Socorro (LACM H-2459; LACM 71-26; AJF 497; AJF 503).

Chaetopleura scabricula seems to be confined to the intertidal and shallow subtidal zones, 0-30 m.

Remarks: *Chaetopleura scabricula* displays considerable intraspecific variation in color, and number and size of tegmental pustules. Specimens from the Revillagigedos Archipelago, Mexico, have a remarkably subdued tegmental sculpture: All 36 specimens of *C. scabricula* from 7 collecting sites at Socorro and San Benedicto islands (ANSP 72501; LACM 71-26; AJF 496, 497, 503, 504, and 508, aboard R/V BAJA EXPLORADOR, Nov. 1979) show only few and relatively small tegmental pustules conferring the specimens an almost smooth, rather than scabrous appearance. Since careful comparisons revealed no other morphological differences (in the articulamentum, slits, girdle elements and bridges, gills, or radula) between Revillagigedos' and mainland's specimens there seemed to be no need to introduce a new name for the population. Although the observed differences would suffice to erect a subspecies, the Revillagigedos population is here recorded simply as a variation, albeit extreme, of *C. scabricula.*

As mentioned above, the type material of *Chiton luridus* Sowerby, 1832, is limited to a single specimen in the H. Cuming Collection (BMNH 19826). It is accompanied by a pink museum label which reads, in part "? Holotype / Figd. Syntype.../ Loc. Stae. Elenae (published) / It was found on stones in five fathoms water / Coll. Cuming Acc. 1829." The specimen, dry, flat, well preserved, soft parts removed, measures 27.7 × 17.0 × 6.4 mm, including girdle; articulamentum white to which a small piece of paper is glued, reading "296..."; strongly carinate; tegmentum uniformly brick-red; lateral areas of intermediate valves with about 8 radial rows of pustules; central areas with 13-15 longitudinal rows of smaller pustules; mucro central, prominent; postmucro concave. Girdle with no hairs or other visible ornamentations; under transmitted light microscopy (× 40) many glassy, pointed, slightly curved spicules up to 300 mm in length are seen, but no hairs or scars indicating the presence of hairs (such as would be expected in specimens of *C. lurida* of authors). The specimen does not correspond to the concept of *"luridus"* of authors and, since the radula and girdle bridges are not available for study, cannot be related with certainty to other biological species in the area. Thus, *Chiton luridus* Sowerby becomes a *nomen dubium.* The type status of this particular specimen is also open to question for two reasons, 1) study of the original labels demonstrates that mixing-up with specimen(s) of *columbiensis* did occur some time in the past, and 2) the specimen, in my opinion, is not the specimen in fig. 20 of Sowerby's (1833: plt. 40) *Conchological Illustrations.* Although the museum label accepts the specimen as "syntype" and Sowerby's figured specimen (S. Morris, *in litt.,* 18 March 1982), the specimen differs from Sowerby's (1833: fig. 20) in color [the specimen is solid red, the figure is mottled greenish brown] and measurements [in Sowerby's (1832) text, it reads 30 × 15 mm; in Sowerby's (1833) fig. 20, it measures 27 × 15 mm; the examined "syntype" specimen measures 27.7 × 17 mm, *i.e.,* considerably *wider* than reported or figured]. The specimen does correspond to *C. luridus* in Reeve's (1847: fig. 85b, plt. 15).

The type material of *Chiton scabriculus* Sowerby, 1832 is accompanied by a blue museum label which reads, in part, "Syntypes / Central America (Guacomayo + P. Portrero) / H. Cuming colln. / 5 specs. Acc. no. 1892 P.Z.S. 1832: 28 / Fig. in Sow.: Conc. Illust. sp. 100 f. 21 (spec. meas. 2.8 cm = fig.) / Reeve: Conc. Icon., 4 pl. 15 fig. 81 (largest spec.)." It consists of 5 specimens, dry, well preserved, soft parts removed; light brown mottled with white and dark brown; moderately carinate, not beaked; posterior edges of valves iii to vii essentially straight; lateral areas with 6-8 radial rows of pustules; central areas with 15-25 longitudinal rows of smaller pustules, many coalescing into ridges or riblets; mucro central or slightly anterior; postmucro area straight or slightly concave. Girdle, under transmitted light microscopy (× 40), shows several long, non-dendritic hairs. In all respects, the specimens agree with Sowerby's description of *Chiton scabriculus* and the current understanding of *"Chaetopleura lurida"* of authors. The largest specimen (Figure 9), illustrated in Reeve (1847, plt. 15, fig. 81), measuring 34.5 × 22.5 × 5.7 mm, is here designated **lectotype** (BMNH 1980113); the other 4 specimens in the lot are here designated **paralectotypes** (BMNH 19800114).

The types of *Chiton columbiensis* Sowerby, 1832, are accompanied by pink museum labels reading, in part, "Loc. Sinu panamae—published / Found under stones at low water / Coll. Cuming Acc. 1829." The lot comprises 4 specimens, dry, flat, well preserved, soft parts removed; strongly carinate; light brown with brighter, reddish dots at posterior edge of valves of larger and smaller specimens; lateral areas with 8-10 radial rows of pustules; central areas with 12-16 longitudinal rows of smaller pustules; mucro, central in the three larger specimens, definitely anterior in the smallest specimen. Girdle, under transmitted light microscopy (× 40), shows no hairs, spicules, or traces of their former presence. The largest specimen, measuring 30.3 × 18.5 × 5.8 mm, conforms with Sowerby's illustration (1833: fig. 15) [Sowerby's text (1832: 58) and illustration

(1833: fig. 15) agree on the measurements, 32 × 19mm] and Reeve's (1847: plt. 15, fig. 82); it is here designated lectotype (BMNH 198111). The other specimens, 23.5mm, 22.8mm and 22.5mm long are designated paralectotypes (BMNH 1980112). The smallest specimen in the group does not appear to be conspecific with the others; it differs in body proportions (width / length ratio, 0.73), and anterior mucro. Since the radulae are no longer available and elements of girdle and bridges could not have been studied without disarticulating the specimens, the name *columbiensis* becomes a *nomen dubium.* Conchologically, the type specimens of *C. columbiensis* could well belong to the same biological species as the type specimen of *C. luridus* here examined, but are sufficiently different from *"luridus"* of authors to dispel the notion of synonymity erroneously entertained since Pilsbry (1892).

Upon examination of type material, *Lepidopleurus bullatus* Carpenter, 1857, *L. b. calciferus* Carpenter, 1857, *Ischnochiton parallelus* Carpenter, 1864, and *I. prasinatus* Carpenter, 1864, have been regarded as synonyms of *"Chaetopleura lurida"* of authors by Smith (1977). Examination of photographs of the type specimens, in the CASIZ Color Slide Series, corroborates the synonymy.

Choetopleura dacrydigera Rochebrune, 1882, based on a single specimen from "Amerique Centrale," was left unfigured. Rochebrune (1882) did not specify whether the specimen came from the Atlantic or the Pacific side of Central America, an omission which has rendered the name taxonomically useless. Examined on a loan (MNHN), the museum label reads, *"Chaetopleura dacrydigera* Rochbr. 1882 / = *C. lurida* Sow. / Amerique Centrale / Bull. Soc. Philom. Paris 1882: 193," and on the top corner, "XV.III. Type" on a red background. The dry, flat, well preserved specimen measures 20mm in length, 13mm in width (including girdle), 4.1mm in height [Rochebrune's (1882: 193) given dimensions are 22mm long, 14mm wide]. Soft parts removed, articulamentum bluish white. Girdle's hairs have fallen off, leaving obvious scars and traces of their former presence clearly visible under microscopic examination (× 40) with transmitted light. The specimen agrees in every respect with the current concept of *Chaetopleura scabricula.* Since there is no such species on the Atlantic side of Central America (or elsewhere), its locality must be restricted to the eastern Pacific, as already suspected by Thiele (1909).

Thorpe's (*in* Keen, 1971) and Abbott's (1974) placement of *Chiton jaspideus* Gould, 1845 in the synonymy of *C. lurida* of authors was in error. Upon examination of the holotype, Smith (1977) concluded that *C. jaspideus* is a junior synonym of *C. hennahi* (Gray, 1828). Study of several lots of *C. hennahi* from Peru and color slides of the holotype of *Chiton jaspideus* (CASIZ Color Slides Nos. 2199-2200) confirmed Smith's (1977) view.

The placement of *Chiton catenulatus* Sowerby, 1832, in the synonymy of *C. lurida* by Thorpe (in Keen, 1971) is also incorrect. The study of the types of *C. catenulatus* (BMNH 198032) revealed the two species to be not only distinct but not even congeneric (Ferreira, in press).

Chaetopleura scabricula is readily distinguished from other species of *Chaetopleura* in the tropical eastern Pacific by the presence of corneous hairs in the girdle. It differs clearly from the three other hairy *Chaetopleura* species in the south eastern Pacific, *C. hennahi, C. peruviana,* and *C. fernandensis,* in the characteristics and distribution of the hairs as well as in the body proportions, tegmental sculpture, and mucro.

Chaetopleura lanuginosa (Dall, 1879)

(Figures 12, 13, 14, *15, 16, 17, 18,* and *19*)

Pallochiton lanuginosus Dall, 1879: 297; plt. 3, fig. 21 (radula); 1882: 287—Pilsbry, 1893, 14: 257-258; plt. 56, figs. 1-11—Dall, 1921a: 193—Oldroyd, 1927: 893-894—Burghardt & Burghardt, 1969: 33 [as *"languinosus,"* typ. err.]
Chiton (Pallochiton) lanuginosus (Dall). Orcutt, 1885: 544

Explanation of Figures *15* to *18, 38, 39, 48, 49*

Figure *15: Chaetopleura lanuginosa* (Dall, 1879): *Chaetopleura (Pallochiton) euryplax* Berry, 1945, paratype (USNM 658237). Tegmental surface of valve i

Figure *16: Chaetopleura lanuginosa* (Dall, 1879). Same specimen as in Fig. *15.* Valve viii

Figure *17: Chaetopleura lanuginosa* (Dall, 1879). Same specimen as in Fig. *15.* Valve viii

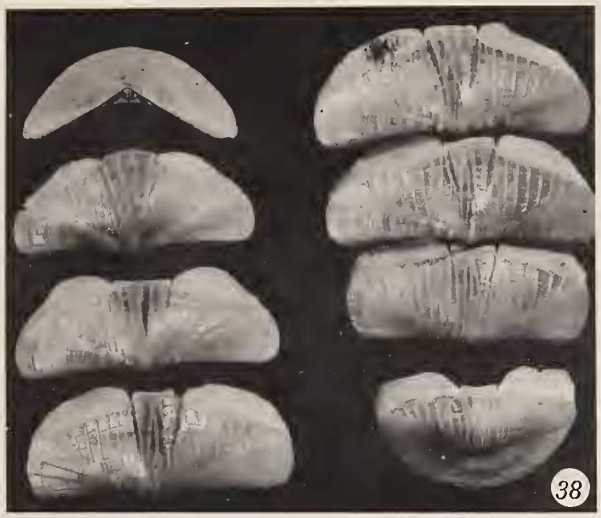
Figure *18: Chaetopleura lanuginosa* (Dall, 1879). Same specimen as in Fig. *15.* Valve viii

Figure *38: Chiton lividus* Middendorff, 1847. Holotype (Zoological Institute, Academy of Sciences, Leningrad, USSR). Tegmental surface of valves

Figure *39: Chiton lividus* Middendorff, 1847. Holotype. Articulamental surface of valves. [Photographs for Figs. *38* and *39* provided through the courtesy of Prof. B. Sirenko, Zoological Institute, Leningrad, USSR]

Figure *48: Chaetopleura thouarsiana* Rochebrune, 1882. Type specimen (MNHN)

Figure *49: Chaetopleura biarmata* Rochebrune, 1882. Type specimen (MNHN)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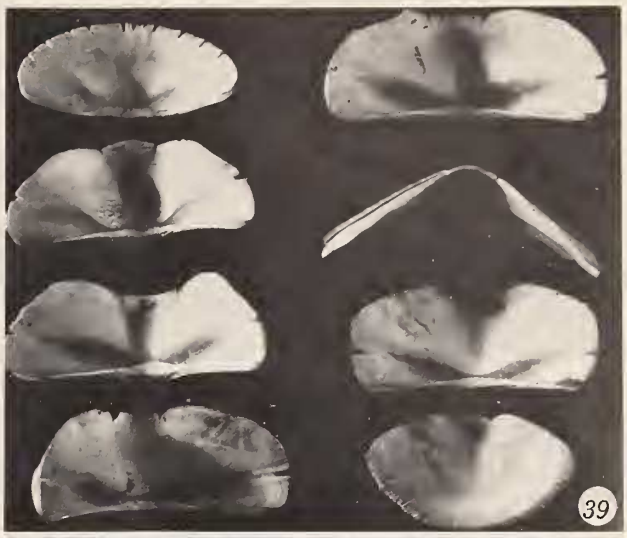
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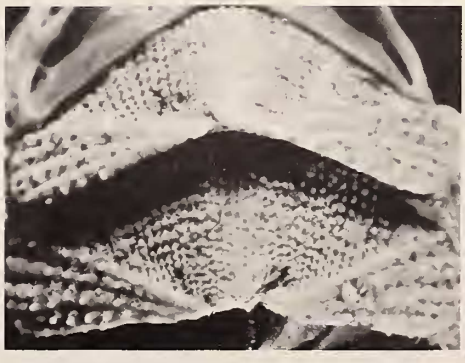
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Chaetopleura (Pallochiton) lanuginosa (Dall). SMITH, 1947a: 18; 1947b: 5 [as *"languinosa,"* typ. err.]—PALMER, 1958: 268; plt. 27, fig. 7

Arthuria filosa CARPENTER *in* DALL, 1882: 287 *(nomen nudum)*

Pallochiton (Arthuria) filosus CARPENTER *in* PILSBRY, 1893, 14: 258-259

Nuttallina magdalena DALL, 1919: 502—SMITH, 1961: 82, 86; 1977: 217, 244 (as possible syn. of *Chaetopleura lanuginosa)*

Chaetopleura magdalena (Dall). KEEN, 1958: 524, Amphineura sp. & fig. 36—ABBOTT, 1974: 401

Tonicia mixta DALL, 1919: 515-516 [in part]—SMITH, 1977: 217, 245-246 [Not *"Chaetopleura mixta* (Dall)" of authors treating Panamic species]

Chaetopleura raripustulosa PILSBRY *in* PILSBRY & LOWE, 1932, 84: 129 *(nomen nudum)*—STEINBECK & RICKETTS, 1941: 549—SMITH, 1961, 30(4): 83 (as syn. of *Chaetopleura euryplax* Berry, 1945)

Chaetopleura (Pallochiton) euryplax BERRY, 1945: 491-492; figs. 1-9—KEEN, 1958: 525, Amphineura sp. & fig. 38—SMITH, 1961, 30(4): 83-86; plt. 8, fig. 2 (with *C. raripustulosa* PILSBRY, 1932, as syn.)

Chaetopleura euryplax Berry. THORPE *in* KEEN, 1971: 877, Polyplacophora sp. & fig. 40—ABBOTT, 1974: 401

Nomenclatural Comments: The species name *lanuginosus* was first published by DALL (1879) with the description and illustration of the radula; further details of the species, assigned to *Pallochiton* Dall, 1879, were later (DALL, 1882) given but no type was specified. PILSBRY (1893) described and figured the species as if new and, like Dall, attributed it to Carpenter's unpublished manuscript. Thus, an equivocal situation arose. PALMER (1958), in a mood of uncertainty, summed it up by pointing out that if the species were judged to be of Dall a series of 5 specimens in the Carpenter Collection of the Redpath Museum (Redpath Museum no. 66) constituted its type material whereas if judged to be of Pilsbry the type lot would be the one studied by Pilsbry at the Academy of Natural Sciences of Philadelphia (ANSP 35684). The question is resolved on the realization that in accordance with Articles 16, 17 and 14b of the International Code of Zoological Nomenclature (ICZN), the authorship of the name *lanuginosus* is clearly Dall's as already indicated by Boss *et al.* (1968) and DAVIS *et al.* (1979).

Type Material: *Pallochiton lanuginosus* Dall, 1879: **Lectotype** (ANSP 35684) and **paralectotypes** (ANSP 353937) herein designated.

Pallochiton (Arthuria) filosus Carpenter *in* Pilsbry, 1893: **Lectotype** (BMNH 1980115), and **paralectotype** (BMNH 1980116) designated herein; locality, "unknown" (PILSBRY, 1893, 14: 259).

Nuttallina magdalena Dall, 1919: Lectotype and paralectotypes (USNM 217924), designated by SMITH (1977: 244-245); locality, "Magdalena Bay, Lower California," Mexico [28°40′ N; 112°00′ W].

Tonicia mixta DALL, 1919: Lectotype (USNM 110345), designated by SMITH (1977: 245-246), and one **paralectotype** here designated [the other specimen in the lot proved to be of a different species]; locality, "Angeles Bay, Gulf of California," Mexico [29°00′ N; 113°30′ W].

Chaetopleura (Pallochiton) euryplax BERRY, 1945: Holotype (S. S. Berry Collection, Cat. No. 8943), and paratypes (Berry Colln., Cat. No. 8564; SDNH Type series no. 5; USNM 658237); locality, "Bahía de Adair, Sonora, Mexico," [31°30′ N; 113°50′ W].

Type Locality: Point Abreojos, Baja California, Mexico [26°44′ N; 113°40′ W] (DALL, 1879: 343).

Description: DALL's (1879) original description of *Pallochiton lanuginosus* was limited to the radula, "Minor lateral normal, bialate; major lateral tridentate, shaft normal Fig. 21" (p. 297). For practical purposes, the species remained unrecognizable until PILSBRY (1893) provided a full account of it, based on Carpenter's unpublished manuscript. To PILSBRY's (1893) description, and to BERRY's (1945) later account of *Chaetopleura euryplax*, the following observations should be added:

Large sized chitons; largest specimen examined, 60mm long (AJF Colln., Bahía San Quintín, Baja California, Mexico, intertidally, *leg.* A. J. Ferreira & W. E. Dailey, 15 Oct. 1971). Carinate; posterior edge of intermediate valves straight but with tendency to beak. Body width / length, mean 0.62; height / length, mean 0.21. Width of valve i / width of valve viii, mean 1.07. Color variable with brown tones predominating. Tegmentum pustulose; on end-valves and lateral areas of intermediate valves, relatively few round pustules (up to 150 μm in diameter) in ill-defined radial rows or as if randomly placed; on central areas, smaller, often elongated pustules in longitudinal rows (about 15 per side) that tend to arch as they diverge forward. Mucro posterior; postmucro area strongly convex, often incurving forward, with prominent, almost terminal, sometimes recurved, pointing upward false mucro. Articulamentum white, posteriorly covered by forward reflecting tegmentum. Sutural laminae subtriangular on valve ii, subrectangular on valves iii to viii. Relative width of sinus (width of sinus / width of sutural laminae) on valve viii, mean 0.33 (n = 10). Insertion teeth well defined; slit formula range 8/11-1-7/9, mode 9-1-9. In anterior valve, insertion teeth tend to be fluted on outer surface and thickened at edges (a feature reminiscent of *Callistochiton);* in posterior valve, teeth relatively shorter, incurved forward, buttressed by strong transversal callus (a feature reminiscent of *Acanthopleura* and *Nuttallina*). Eaves solid. Gills, about 30 plumes per side, holobranchial, abanal. Girdle's upper surface (Figure 12) covered with juxtaposed, spiculoid scales, about 50 × 10 μm, and abundant, randomly distributed glassy spicules, about 500 × 30 μm, mostly straight and pointed; bridges (Figure 13) crowded with long, pointed, glassy spicules, up to 200 μm long, 15 μm thick, disposed mostly in palisade; undersurface

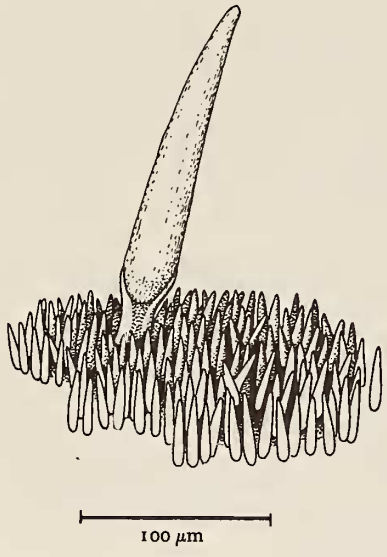

Figure 12

Chaetopleura lanuginosa (Dall, 1879). Specimen 24mm long (LACM 38-3, Magdalena Bay, Baja California, Mexico). Girdle's upper surface scales and spicules

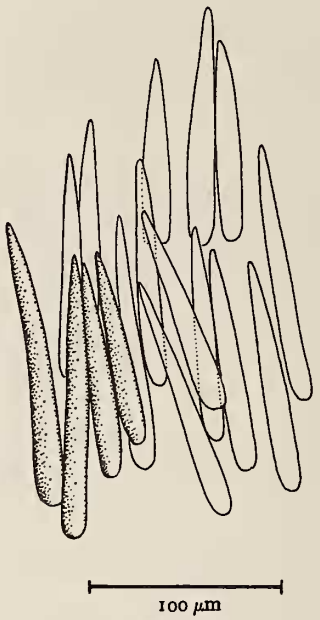

Figure 13

Chaetopleura lanuginosa (Dall, 1879). Same specimen as in Fig. 12. Spicules on the girdle's bridges

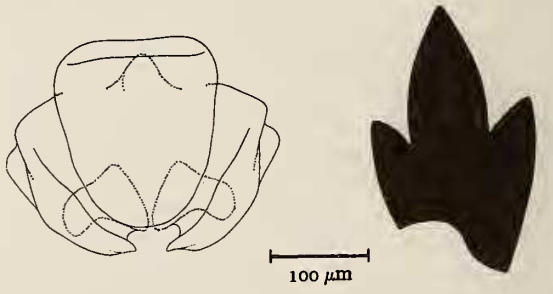

Figure 14

Chaetopleura lanuginosa (Dall, 1879). Same specimen as in Fig. 12. Radula's median tooth, first lateral teeth, and head of major lateral tooth

paved with flat, transparent, rectangular scales, about 50 × 20 μm, identical to those seen in *Chaetopleura scabricula.* Radula (Figure 14) of a specimen 24mm long (LACM 38-3), measures 8.0mm (33% of specimen's length) comprising 35 rows of mature teeth; median tooth rectangular, 150 μm wide at anterior blade; first lateral teeth 160 μm long; major lateral teeth with tricuspid head, about 165 μm wide.

Distribution: *Chaetopleura lanuginosa* is present in the quasi tropical waters of the Gulf of California, and in the warm-temperate waters of the Pacific coast of the Baja California peninsula. The two populations seem to be discontinuous. On outer Baja California, *C. lanuginosa* ranges from southern California to Bahía Magdalena; northernmost verified record, Ensenada, Baja California, Mexico (31°55′ N; 116° 50′ W) (LACM 66-5, *leg.* J. H. McLean, 9 June 1966, intertidally) [a single specimen, 8.6mm long, *leg.* Paul J. & Antonio J. Ferreira, 8 April 1974, intertidally, at White's Point, San Pedro California, 33°42′ N, AJF 147, identified as a juvenile of *C. lanuginosa,* constitutes a record so far uncorroborated]; southernmost verified record, Marry Channel, Bahía Magdalena, Baja California, Mexico (23° 30′43″ N; 111°50′01″ W) (LACM-AHF 1718-49). Between these two extreme points, the species has been collected at many other sites such as Punta Banda (CASG 43929), Ensenada (LACM 65-53), Camalu (LACM 66-2), Bahía San Quintín (AJF Colln.), Guerrero Negro (L. Shy Colln.), and Bahía Magdalena (LACM 38-3; LACM 66-8; LACM 71-14; LACM 66-232; LACM A-1207; LACM A-2777; LACM-AHF 1718-49; LACM-1721-49; CASG 10223).

In the upper Gulf of California, *Chaetopleura lanuginosa,* hitherto known as *"euryplax,"* has been found from San Felipe [31°03′ N; 114°49.3′ W] (LACM 61-6; LACM P465.62; CAS 010086; AJF 27), Bahía de los Angeles (LACM-AHF 700-37), to Bahía de Concepcion [26°40′ N; 111°50′ W] (LACM A.6542; SDNH 23648) on the Baja California side; and Bahía de Adair (LACM P.465.62), Guaymas (G. A.

Hanselman Colln.; L. Shy Colln.; LACM-AHF 1039-40) and Bahía Topolobampo, Sinaloa [25°37'N; 109°03'W] (LACM 59-9), on the mainland side.

Apparently, *Chaetopleura lanuginosa* is not present in the lower Gulf; a single specimen, 4.4mm long, of what seems to be a juvenile of *C. lanuginosa* was collected 12km NE of Cabo San Lucas, Baja California (CAS 010090) but given its small size,the identity remains uncertain.

Judging from the collections, *Chaetopleura lanuginosa* is predominantly a species of the intertidal zone; however, its bathymetric range is known to extend from 0 to 91m (L. Shy Colln., SE of San Antonio Point, Guaymas, Sonora, Mexico, *leg.* L. Shy, November 1978).

Remarks: The original specimen, or the radula upon which Dall (1879) introduced the species *Chaetopleura lanuginosa* could not be found at the U.S. National Museum (Dr. J. Rosewater, *in litt.*, 3 Oct. 1980) and is presumed lost. But a lot in the Academy of Natural Sciences of Philadelphia (ANSP 35684) has been regarded as part of the original series used by Dall and, as such, syntypic material (Mary A. Garback, Collection Manager, ANSP, *in litt.*, 3 March 1981). The 5 specimens in the lot are accompanied by a red-dotted cardboard label which reads *"Pallochiton lanuginosus* Cpr. / Type 35684 / Pta. Abreojos / Henry Hemphill ! L. Cal." Four of the specimens are preserved dry, flat, entire except for removed soft parts. They are 39, 42, 46, and 47mm long. The smallest and the largest specimens seem to be the ones illustrated by Pilsbry (1893) in plt. 56 as fig. 1 and fig. 4, respectively. The fifth specimen in the lot, disarticulated and segregated in a separate vial, is estimated to be 40mm long; slit formula, 9-1-11. The specimens correspond in every respect to the description provided by Carpenter *in* Pilsbry (1893: 257), and to the current understanding of the species. Palmer (1958: 268) stated that the specimen in plt. 56, fig. 4 of the Manual of Conchology (Pilsbry, 1893: 14) had been selected by Pilsbry as lectotype; but Pilsbry's action not being known otherwise, a lectotype designation seems in order. Accordingly, the disarticulated specimen in the lot, comprising loose valves and a dry girdle, already segregated, is here designated **lectotype** (recatalogued, ANSP 353937), and the other 4 specimens, **paralectotypes** (ANSP 35684).

Nuttallina magdalena Dall, 1919, was equated with *Chaetopleura lanuginosa* by Smith (1977) upon examination of the type material (CASIZ Color Slides Nos. 3137-3139 and 3262-3263). Smith's action is here corroborated.

The placement, herein, of *Tonicia mixta* Dall, 1919, in the synonymy of *Chaetopleura lanuginosa* culminated an interesting phase of this work. Smith (1977) recognized *Tonicia mixta* as a member of the genus *Chaetopleura* (an action first taken by Keen, 1958), and described its type material as consisting of two specimens, "an entire specimen with all valves in place" which he designated as lectotype, and "another that has been disarticulated" which he designated as paralectotype (p. 245). Smith's observations were documented with photographic color slides (CASIZ Color Slides Series Nos. 2178, 2183, and 2184).

However, attentive study of Smith's color slides disclosed that the two syntype specimens of *Tonicia mixta* photographed by Smith are not conspecific. From the color slides it is apparent that the entire specimen designated by Smith as lectotype of *mixta* (Color Slide No. 2183) is conspecific with *Chaetopleura lanuginosa* (Dall, 1919), whereas the disarticulated specimen designated as paralectotype (Color Slides Nos. 2178 and 2184) corresponds, indeed, to the concept of *"C. mixta"* of authors treating the Panamic species.

To resolve this matter, the type material of *Tonicia mixta* (USNM 110345) was re-examined on a loan. And another puzzle came to light: The Museum catalogue indicates that the lot consists of 4 specimens when, in fact, only 3 specimens are present (Dr. J. Rosewater, *in litt.*, 29 Aug. 1979). Now, since Smith *(op. cit.)* reported solely on 2 specimens in the lot, "one entire and another disarticulated," it became perplexing to realize that the syntype lot of *T. mixta* studied anew comprises one more specimen than Smith mentioned, and one less than listed in the Museum catalogue. Dall (1919) provided no clue to the number of specimens present in the original lot.

Here examined, the three specimens in the type lot of *Tonicia mixta* Dall, 1919 (USNM 110345) are preserved dry, two entire and curled, one disarticulated. The two entire specimens agree in every respect with the present interpretation of *Chaetopleura lanuginosa* Dall, 1879: both light brown with creamy stripe, very sparse pustules on end valves and lateral areas of intermediate valves, posterior mucro, markedly convex postmucro area forming false mucro, girdle with long (up to 350μm) hyaline spicules. The disarticulated specimen (loose valves only, no girdle or soft parts) corresponds to the concept of *C. mixta* of authors: valves markedly carinate, jugal angle about 90°, round pustules (about 120μm in diameter and height) in quincunx on valve i, sparser and larger (about 150μm in diameter and height) on well defined and elevated lateral areas, central areas with 11-13 longitudinal rows per side of smaller (about 100μm in diameter, less in height) pustules, mucro central, postmucro straight at about 45° angle, no false mucro, width of valve i larger than valve viii (6.3mm and 5.3mm, respectively), white articulamentum except for brown discolorations at posterior end of valves ii-vii, slit formula 12-1-11 [in some valves there are minute notches at the edge of the insertion teeth which, on a superficial examination, could be mistaken for extra slits, a mistake which Dall (1919) obviously made on describing

the species]. The two entire specimens, very similar to each other, clearly differ from the disarticulated one in the following points which bear stressing: 1) pustules much sparser on end valves and lateral areas of intermediate valves (about 4 pustules/mm² in the entire specimens *vs.* 14 pustules/mm² in the disarticulated one), 2) lateral areas much less elevated, 3) tegmental surface smoother, almost shiny, 4) central areas with only 8 rows (instead of 11-13) of pustules per side, 5) mucro posterior, and 6) postmucro convex with posterior, almost terminal false mucro.

Unfortunately, Smith (1977), as first reviser, overlooking as Dall (1919) did, that he had before him specimens of two different species, designated as lectotype of *Tonicia mixta* a specimen that must now be referred to *Chaetopleura lanuginosa;* in so doing, he occasioned the name *mixta* Dall, 1919, to fall into the synonymy of *C. lanuginosa,* and unwittingly left *"Chaetopleura mixta"* of authors without a name.

Hence, the status of the specimens in the type lot of *Tonicia mixta* Dall, 1919, appears as follows: Of the two entire specimens, the "most curled" one (for lack of any other tenable distinction) is the lectotype as designated by Smith (1977) and determined by direct comparison with Smith's color slides of the specimen (CASIZ Color Slide No. 2184); the "less curled" one, a paralectotype as here designated. The disarticulated specimen is to be disregarded as not conspecific.

On describing *Chaetopleura euryplax* in the upper Gulf of California, Berry (1945) observed that the species was similar to *C. lanuginosa* although "critical inspection shows them to differ in one way or another at almost every point" (p. 492). The assumed differentiating characters were "1) the much longer and proportionately less deeply slitted insertion plates, particularly those of valve i, 2) the convex and more pointed tail valve, with its narrower, square sinus and wider, fewer, more oblique and much less forward-projecting teeth, 3) the generally sparse sculpture, especially the much less numerous lirae of the pleural regions" (*op. cit.,* p. 492). The results of this study fail to support Berry's contention. The examination of large collections of specimens from the Gulf of California, including many topotypes and a paratype of *C. euryplax* (USNM 658237) (Figures *15, 16, 17,* and *18*), revealed no substantial morphological differences from specimens collected on the outer coast of Baja California, except for slightly larger sizes and less accentuated tegmental sculptures.

Pallochiton (Arthuria) filosus Carpenter *in* Pilsbry, 1893, is based on two specimens, at one time part of the H. Cuming Collection (nos. 23 and 28, *fide* Pilsbry, 1893), now at the British Museum (Natural History). The specimens are well preserved, soft parts removed, dry, exactly the same size (29 × 15 × 6mm), partly disarticulated (valves i, ii, and vii are loose, the others in place, in both specimens). But they differ in color: the darker, brown specimen is here designated **lectotype** (BMNH 1980115) (Figure *19*), the other, light beige, is designated **paralectotype** (BMNH 1980116). They conform in every respect to the description given by Pilsbry (1893), and are morphologically indistinguishable from outer Baja California specimens of *Chaetopleura lanuginosa.*

Chaetopleura roddae Ferreira, spec. nov.

(Figures *20, 21, 22,* 23, 24, 25, *26,* and *27*)

"Chaetopleura..." Thorpe *in* Keen, 1971: 877, Polyplacophora, sp. & fig. 39

Diagnosis: Medium sized chitons, carinate, grayish brown to orange or pink. Tegmentum with round pustules in quincunx on end valves and lateral areas of intermediate valves, in longitudinal rows on central areas. Mucro central; postmucro area convex but with no false mucro. Girdle with abundant glassy, whitish spicules. Insertion teeth of posterior valve directed outwardly, not incurved forward. Radula major lateral teeth, tricuspid.

Type Material: **Holotype** (CAS 028808); **paratypes** (CAS 028809; LACM 1977; USNM 784716; ANSP A9868).

Type Locality: Salinas, Ecuador (2° 12′ S; 80°58′ W), intertidal zone.

Explanation of Figures *20* to *22, 26, 27, 40* to *43*

Figure *20: Chaetopleura roddae* Ferreira, spec. nov. **Holotype** (CAS 028808). Tegmental surface of valve i

Figure *21: Chaetopleura roddae* Ferreira, spec. nov. **Holotype** (CAS 028808). Tegmental surface of valve viii

Figure *22: Chaetopleura roddae* Ferreira, spec. nov. **Holotype** (CAS 028808). Articulamental surface of valve viii

Figure *26: Chaetopleura roddae* Ferreira, spec. nov. **Paratype** CAS 028809), 20.5 mm long

Figure *27: Chaetopleura roddae* Ferreira, spec. nov. Close-up of same paratype as in Fig. *26*

Figure *40: Chaetopleura fernandensis* Plate, 1899. **Lectotype** (Zoologisches Museum, Humboldt Universität, Berlin, DDR). Anterior valves

Figure *41: Chaetopleura fernandensis* Plate, 1899. **Lectotype.** Intermediate valves

Figure *42: Chaetopleura fernandensis* Plate, 1899. **Lectotype.** Posterior valves

Figure *43: Variolepsis iquiquensis* Plate, 1899. **Lectotype** (Zoologisches Museum, Humboldt Universität, Berlin, DDR)


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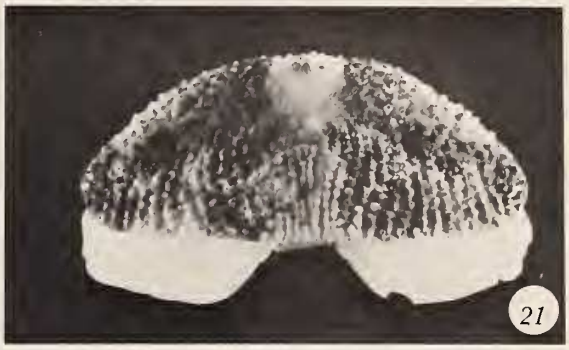
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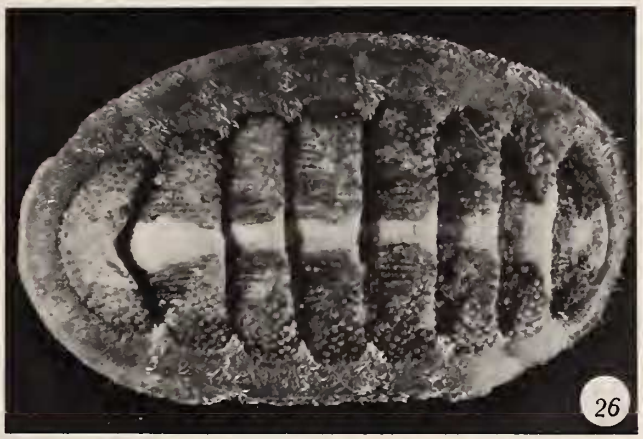
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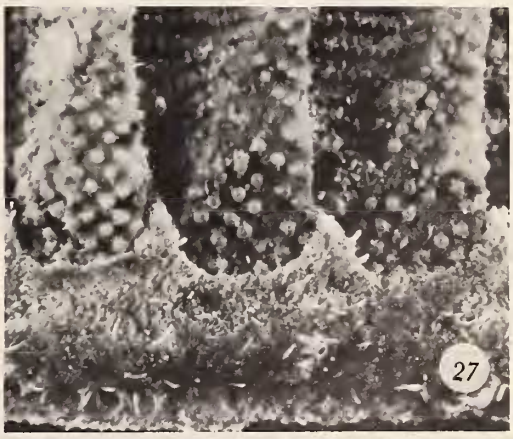
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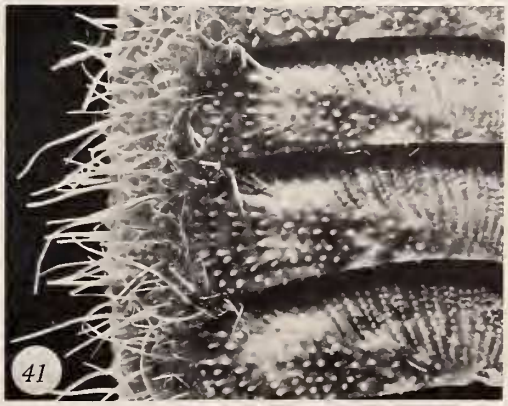
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Description: **Holotype** (Figures *20, 21, 22*) The specimen, preserved in alcohol and fully extended, 33.6mm long (including girdle), 23.5mm wide (at the iv level), is the second largest in a lot of 9 specimens collected at Salinas, Ecuador, in the intertidal zone (LACM 70-9, *leg.* J. H. McLean, 5-6 March 1970). Carinate, jugal angle about 110°; posterior edge of intermediate valves straight, not beaked. Color, mottled grayish brown and cream. Girdle, 3.0mm wide, dark orange brown against which whitish spicules stand out conspicuously. Tegmentum markedly pustulose; on end-valves and lateral areas of intermediate valves, pustules (about 150-170μm in diameter and height) mostly in quincunx or ill-defined radial rows, stand about 150μm apart from each other; on central areas of intermediate valves, smaller pustules (100-120μm in diameter and height), round to elongate, flat topped, in longitudinal rows (about 20 per side) crowded at jugum. Lateral areas, moderately elevated in valve ii, progressively less elevated in posterior valves, only defined by differences in sculptural features on valve vii. Mucro central, not prominent; antemucro area somewhat inflated; postmucro area markedly convex but without false mucro. Articulamentum bluish white. Insertion teeth well defined; posterior valve with teeth directed outwardly and no transversal callus; slit formula 9-1-8. Eaves solid. Gills, about 30 plumes per side, holobranchial, abanal. Width of valve i / width of valve viii = 10.0mm / 8.7mm = 1.15. Relative width of sinus on valve viii (width of sinus / width of sutural laminae) = 1.2mm / 4.5mm = 0.27. Sutural laminae subtriangular on valve ii to subrectangular in posterior valves.

Girdle's upper surface (Figure 23) covered with juxtaposed, spiculoid scales (40-60μm long, 5-10μm wide), with abundant glassy, whitish, curved, pointed spicules (up to 500μm in length, 45μm in thickness) interspersed; bridges (Figure 24) crowded with slender, pointed, glassy spicules, up to 250μm long, 18μm thick, disposed in palisade; undersurface paved with flat, transparent, rectangular scales, 45 × 20μm, identical to those seen in *Chaetopleura scabricula.* Radula (Figure 25) 11.0mm long (30% of specimen's length) comprises some 30 rows of mature teeth; median tooth rectangular, about 300μm long, 250μm wide at anterior blade; first lateral teeth about 250μm long; second lateral teeth with tubercle (about 120 × 60μm) at inner edge, near upper end, and tricuspid head about 400μm long (at longest middle cusp) and 250μm wide; outermarginal teeth elongate, 300 × 150μm.

Paratypes (Figures *26* and *27*): Varying in length from 34.6mm to 10.2mm, and in color from drabby gray to brown mottled with cream and bright red areas on valves i and iv. A paratype, 19.7mm long, disarticulated for study, shows features much like the holotype; girdle 2.1mm wide, slit formula 9-1-9, 25 gill plumes per side, radula 6.7mm long with 30 rows of mature teeth.

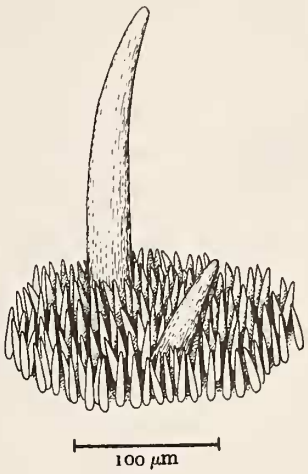

Figure 23

Chaetopleura roddae Ferreira, spec. nov. Holotype (CAS 028808). Girdle's upper surface scales and spicules

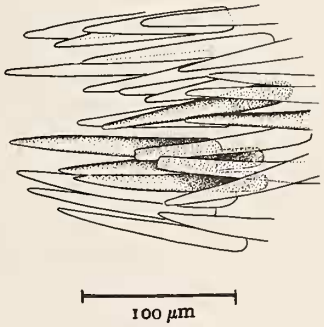

Figure 24

Chaetopleura roddae Ferreira, spec. nov. Holotype. Spicules of the girdle's bridges

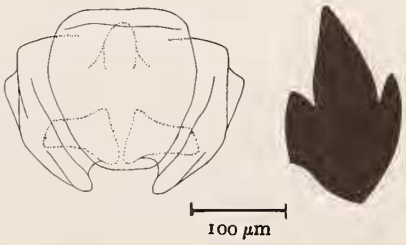

Figure 25

Chaetopleura roddae Ferreira, spec. nov. Holotype. Radula's median tooth, first lateral teeth, and head of major lateral tooth

Individual Variation: Among 86 specimens of *Chaetopleura roddae* examined, from 22 lots, largest specimen is 42mm long (LACM 10846, Venado Island, Panama, *leg.* E. Bergeron, 16 Sept. 1966). Color varies from drabby grayish brown often mottled with cream or light green to uniform bright orange, rose, or pink. Girdle's glassy spicules usually abundant (by comparison to specimens of other species of *Chaetopleura* bearing such spicules) but varying appreciably in number from specimen to specimen. Body proportions: width/length, mean 0.61, height/length, mean 0.21 (n = 20). Slit formula range 8/10-1-7/8, mode 8-1-8; width of valve i/width of valve viii, mean 1.14; relative width of sinus on valve viii, mean 0.33 (n = 6).

Distribution: The known geographical range of *Chaetopleura roddae* extends between latitudes 8° N and 3° S. Northernmost record, Fort Kobbe, Panama (8°55′ N; 79° 35′ W) (LACM 10820); southernmost record, Bocapan, Tumbes Prov., Peru (3°44′ S; 80°46′ W) (LACM 72-81). Specimens have been examined from sites in Panama (LACM 65-22; LACM 75-54; LACM M-864; LACM 10787; LACM 10810; LACM 10820; LACM 10821; LACM 10843; LACM 10844; LACM 10846; LACM 10848; LACM 10849; LACM-AHF 451-35; LACM-AHF 863-38), Ecuador (LACM 70-9; LACM 70-13; LACM 209-34; LACM-AHF 210-34), and Peru (LACM 72-83). Bathymetrically, *C. roddae* ranges from the intertidal zone to 54-90m (LACM-AHF 863-38, Bahía Honda, Panama).

Remarks: *Chaetopleura roddae* is remarkably similar to *C. lanuginosa* with which it must be assumed closely related. The two species are allopatric, and live some 4000kms apart. They have the same body proportions (Table 1), the radulae are identical, and the girdles are indistinguishable for practical purposes (the same spiculoid processes, glassy spicules, and bridges with densely packed slender spicules in a palisade). They differ most in the shape of the posterior valve, a difference large and consistent enough to warrant considering them as distinct biological entities at the species level. In contrast with *C. lanuginosa*, specimens of *C. roddae* have convex postmucro area on tail valve ["the posterior margin swollen" in THORPE's (*in* KEEN, 1971) description of "39. *Chaetopleura...*"] but without forming a false mucro; mucro central (instead of posterior): insertion teeth directed outward (not recurved forward) and not buttressed by callus. Other smaller and subtler features of *C. roddae* that separate it from *C. lanuginosa* are the presence of more abundant glassy spicules in the girdle, more abundant and more crowded tegmental pustules, and less accentuated (less elevated) lateral areas in valves iii to vii.

Chaetopleura roddae is sympatric with *C. lurida* in Panamá, and specimens of the two species have been collected together, side-by-side, at the same site.

This new species of *Chaetopleura* is here named ***roddae*** after Dr. Peter U. Rodda, Department of Geology, California Academy of Sciences, who, in the course of the years, has fostered and promoted my interest in taxonomy and critically and cheerfully encouraged my work with chitons.

Chaetopleura unilineata Leloup, 1954

(Figures *28, 29,* 30 and 31)

Chaetopleura unilineata LELOUP, 1954: 1-6, figs. 1, 2
"Chaetopleura mixta (Dall, 1919)" *ex auttore* treating Panamic species. KEEN, 1958: 524, Amphineura, sp. & fig. 37— THORPE *in* KEEN, 1971: 879, Polyplacophora, sp. & fig. 42— ABBOTT, 1974: 401. [Not *Tonicia mixta* Dall, 1919, = *Chaetopleura lanuginosa* (Dall, 1879)].

Nomenclatural Comments: As mentioned before, the biological species known heretofore as *"Chaetopleura mixta* (Dall, 1919)" became without a name when *C. mixta* proved to be an objective synonym of *C. euryplax* Berry, 1945, itself a junior synonym of *C. lanuginosa* (Dall, 1879). The first available name for this common tropical species is *Chaetopleura unilineata* Leloup, 1954.

Diagnosis: Medium size chitons, carinate, beige to pink or orange. Tegmentum with pustules in quincunx on end valves and lateral areas of intermediate valves, in longitudinal rows on central areas. Mucro central to slightly anterior; postmucro, concave. Girdle with minute oval scales, and conspicuous glassy spicules; girdle bridges with no spicules. Posterior valve with insertion teeth directed outward, *i.e.*, not incurved forward. Radula major lateral teeth, bicuspid.

Type Material: *Chaetopleura unilineata* Leloup, 1954: Holotype (Institut Royal des Sciences Naturelles de Belgique, Bruxelles).

Type Locality: "Machalillo [= Machallila], Ecuador," [1°29′ S; 80°46′ W], at 5-8m of depth.

Description: In the description of *Chaetopleura unilineata* LELOUP (1954) made no mention of the characteristics of the girdle bridges or the radula. Examination of the holotype provided the much needed additional information. The girdle bridges, clearly recognized in the alcohol-preserved specimen, are "empty" and show no spicules or any other ornamentation. The radula has rectangular median teeth with small blade at anterior end, and major lateral teeth with empty bicuspid heads. The gills, holobranchial and abanal, comprise about 22 plumes per side.

Supplementary Observations: Among 161 specimens of *Chaetopleura unilineata* examined, from 41 lots, largest specimen is 32mm long (L. Shy Colln., Punta Jualapan,

Manzanillo, Colima, Mexico, *leg.* L. Shy, Jan. 1976, at 31m). Specimens (Figures *28, 29*) carinate, jugal angle about 100°; posterior edge of intermediate valves, straight, not beaked or angled. Color variable, from beige-brown to uniformly bright red or orange, often with wide creamy stripe along jugum (also a common color pattern of *C. lanuginosa).* Body width / length, mean 0.64; height / length, mean 0.23. Tegmentum pustulose. On end valves and lateral areas, pustules usually round, large (about 120-140 μm in diameter and height, mostly in quincunx, varying in number from abundant and crowded to sparse and irregularly placed; on central areas, pustules often elongate, smaller (about 50 μm in diameter, less in height) in well spaced longitudinal rows (6-15 per side), crowded at jugum. Mucro central to slightly anterior; postmucro concave. Articulamentum white, often with transversal brown discolorations in posterior half of valve. Slit formula range 6/13-1-8/14, mode 11-1-12. Width of valve i / width of valve viii, mean 1.20; relative width of sinus on valve viii, mean 0.31. Girdle's upper surface (Figure 30) covered with minute, nippled, ovoid scales (40 × 18 μm), and slightly curved, pointed, thin (15-20 μm) glassy spicules varying in number from few to very abundant, and in length from inconspicuous to 500 μm; girdle bridges, empty; undersurface with translucent, colorless rectangular scales like

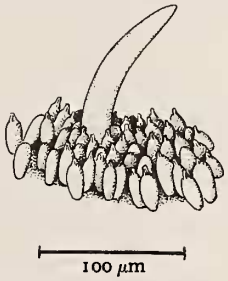

Figure 30

Chaetopleura unilineata Leloup, 1954. Specimen 18mm long (CAS 010091, Punta Colorada, Guaymas, Sonora, Mexico). Girdle's upper surface scales and spicules

in *C. scabricula.* In a specimen 18mm long (CASIZ 010091, Punta Colorado, Guaymas, Mexico), the radula (Figure 31) 5.5mm long (33% of specimen's length) comprises 30 rows of mature teeth; median tooth rectangular, about 180 μm wide, 200 μm long, with small blade at anterior end; first lateral teeth about 150mm long; major lateral teeth with bicuspid head (180 μm long, 130 μm wide), outer cusp larger and longer; spatulate teeth, about 300 μm long, with only moderate flexure; outer marginal teeth, elongate, 150×90 μm.

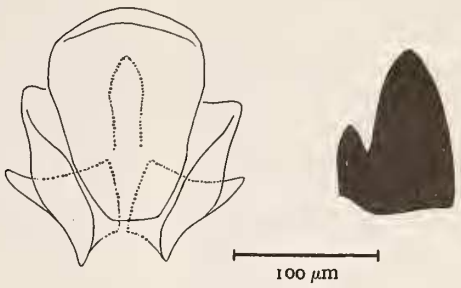

Figure 31

Chaetopleura unilineata Leloup, 1954. Same specimen as in Fig. 30. Radula's median tooth, first lateral teeth, and head of major lateral tooth

In the extremes of intraspecies variation, two forms of *Chaetopleura unilineata* may be distinguished, 1) often in bright tones of orange or red, with end valves and lateral areas crowded with numerous, conspicuous, quincuncially arranged pustules and crowded longitudinal rows of smaller pustules on central areas, and 2) drab brown color specimens, often with wide creamy stripe along jugum, with few, scattered pustules on end valves and lateral areas, and widely spaced longitudinal rows of smaller pustules on central areas. These variations in color and tegmental sculpture caused considerable confusion in the investigation of the species [at one time in this study these two morphs were even regarded as different species], particularly since, on a superficial examination, specimens of the latter form may not be readily separable from specimens of *C. lanuginosa* (with exactly the same color pattern and tegmental sculpture) collected at the same site. No relationship was found between the two morphs of *C. unilineata* and geography or depth.

Distribution: *Chaetopleura unilineata* ranges from the head of the Gulf of California to northern Peru. Northernmost verified record, San Felipe, Baja California, Mexico (31°00′ N; 114°52′W) (AJF Colln., and many others); southernmost record, Sechura Bay, Peru (5°39.5′S; 81°01′W) (LACM-AHF 845-38, 1 specimen at 17m). The species has been collected at many sites in between; in the Gulf of California, at Willard Id. (LACM-AHF 1063-22), Tiburon Id. (LACM 67-18), Puertecitos (LACM 69-22; LACM 69-26), Guaymas (CASG 60520; CASG 60521; CAS 010091; CAS 010113; L. Shy Colln.); Bahía de los Angeles (L. Shy Colln.), Topolobampo (CAS 010115), Mazatlán (CAS 010114), La Paz (LACM 66-30); and further south, at Manzanillo, Colima (L. Shy Colln.), Bahía Tenacatita, Jalisco, Mexico (LACM 38-6; LACM 38-7; LACM-AHF 272-34), Gulf of Fonseca, Nicaragua (CAS 010085), Bahía Jobo, Bahía Ballena, and Bahía Cocos, Costa Rica (LACM 72-19; LACM 72-45; LA-

CM 72-58; LACM-AHF 116-33; AJF Colln., R/V *Searcher* sta. 394), Taboga Id., Secas Is., Cape Mala, Tolita Is., Panamá (LACM 66-42; LACM 10787; LACM-AHF 251-34; LACM-AHF 960-39), Vijía, Colombia (Universidad del Valle Colln., Cali, Colombia), and Bahía Santa Elena, Ecuador (LACM-AHF 209-34).

Bathymetrically, *Chaetopleura unilineata* has been collected from the intertidal zone to 90m (CAS 010113, off Cabo Haro, Guaymas, Sonora, Mexico, *ex* Myra Keen, *Ariel* Exped., 28 August 1962).

Remarks: The holotype of *Chaetopleura unilineata* initially deposited in the Zoologische Museum of Hamburg has been granted to the Institut Royal des Sciences Naturelles de Belgique, Bruxelles (Dr. Wilfrida Decraemer, *in litt.*, 7 December 1981). The type material consists of a single specimen preserved in alcohol, and two slides. The specimen is accompanied by two old labels: one, typed, stating "Chaetopleura unilineata Type / Det. E. Leloup 1954," another, handwritten, adding "28. Machalillo Ecuador / 5-8m Tiefe / Kpt. R. Paessler leg. 4.12.1912 / ded. 28.II.1913 / 1 stck." The specimen is partly disarticulated; valves i, ii, vii, and viii loose; valves iii, iv, v, and vi in place but longitudinally broken on the left. Girdle and soft parts in place except for two loose fragments of the girdle. The two slides accompanying the specimen bear fragments of the girdle's upper and under surface scales; a companion label reads "32 Moll. Mod. II / D2 I.G.: 11.365 / Chaetopleura unilineata Leloup, 1954 / Machalillo-Ecuador (Zool. Mus. Hamburg, 1912) / Det.: Dr. E. Leloup, 1954." The specimen corresponds in every respect to Leloup's (1954) description and illustrations except for the length reported as 7.5mm, but here measured (including girdle) as near 8.5mm. A fragment of the anterior part of the radula, almost loose, was detached and mounted on a glass slide for microscopic examination (A. J. Ferreira, 27 January 1982).

In the available maps, the locality "Machalillo, Ecuador" could not be found; Machalilla, instead, was located and is here assumed to be the place given by Leloup (1954) as the collecting site for the type specimen of *Chaetopleura unilineata*.

Leloup *(op. cit.)* did not differentiate *Chaetopleura unilineata* from other species of *Chaetopleura* in the eastern Pacific but compared it, instead, with *C. asperrima* (Gould, 1852) from southern Brazil, and *C. asperior* (Carpenter *in* Pilsbry, 1892) from east Asia.

Chaetopleura unilineata is sympatric with two other species of *Chaetopleura*, *C. lanuginosa* in the northern half of its range and *C. roddae* in the southern half. As mentioned above, *Chaetopleura unilineata* may be easily confused with *C. lanuginosa* on account of their similar tegmental sculpture and color pattern. However, the two species differ clearly in 1) shape of posterior valve (mucro posterior, postmucro strongly convex with false mucro in *C. lanuginosa;* mucro central to slightly anterior, postmucro concave with no false mucro in *C. unilineata*), 2) insertion teeth of posterior valve (recurved forward, buttressed by transversal callus in *C. lanuginosa;* directed outward, with no callus in *C. unilineata*), 3) girdle bridges (with abundant, slender spicules densely packed in palisade in *C. lanuginosa;* empty of spicules or other elements in *C. unilineata*), 4) radula's major lateral teeth (tricuspid in *C. lanuginosa;* bicuspid in *C. unilineata*), and 5) although less reliably, slit formula (9-1-9 in *C. lanuginosa;* 11-1-12 in *C. unilineata*).

In the southern part of the range, *Chaetopleura unilineata* may be confused with *C. roddae* Ferreira on account of similarities in 1) color, 2) tegmental sculpture, 3) central mucro, and 4) posterior valve's outward directed insertion teeth. However, the two species differ sharply in 1) girdle's upper surface scales (ovoid in *C. unilineata;* spiculoid in *C. roddae*), 2) girdle bridges (empty in *C. unilineata;* densely spiculated in *C. roddae*), and 3) radula's major lateral teeth (bicuspid in *C. unilineata;* tricuspid in *C. roddae*).

Explanation of Figures *28, 29, 32, 36, 37, 44* to *47*

Figure *28: Chaetopleura unilineata* Leloup, 1954. Specimen 19mm long (L. Shy Colln., Smith Id., Bahía de los Angeles, Gulf of California, Mexico). Close-up of anterior valves

Figure *29: Chaetopleura unilineata* Leloup, 1954. Same specimen as in Fig. *28*. Close-up of posterior valves in profile

Figure *32: Chaetopleura shyana* Ferreira, spec. nov. **Holotype** (CAS 028810). Tegmental surface of valves i, ii, vii, and viii

Figure *36: Chaetopleura shyana* Ferreira, spec. nov. **Paratype** (AJF Colln.), 14.5mm long

Figure *37: Chaetopleura shyana* Ferreira, spec. nov. Close-up of same paratype as in Fig. *36*

Figure *44: Chaetopleura benaventei* Plate, 1899. **Lectotype** (Zoologisches Museum, Humboldt Universitat, Berlin, DDR)

Figure *45: Ischnochiton (Trachydermon) asperior* Carpenter *in* Pilsbry, 1892. **Holotype** (USNM 24121)

Figure *46: Ischnochiton (Trachydermon) asperior* Carpenter *in* Pilsbry, 1892. **Holotype.** Tegmental surface of valves i, vii and viii

Figure *47: Ischnochiton (Trachydermon) asperior* Carpenter *in* Pilsbry, 1892. **Holotype.** Articulamental surface of valves i, vii, and viii